ATSC/DVB-3

2U Digital Stereo Speaker Monitor

(Document P/N **821507**, Rev-**D**)

with AC-3 and AES/EBU Inputs on
XLR and BNC, Selected Digital to Analog
Outputs on XLR, Six 53-Segment
Level Meters, and Phase Indication

User Manual

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Important Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched, particularly at plugs convenience receptacles and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.
12) Use only with the cart stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13) Unplug this apparatus during lightning storms or when unused for long periods of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15) Do not expose this apparatus to rain or moisture.
16) The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

CAUTION!

In products featuring an audio amplifier and speakers, the surface at the side of the unit, where the audio amplifier heat sink is internally attached, may get very hot after extended operation. When operating the unit excercise caution when touching this surface and ensure that external materials which may be adversely affected by heat are not in contact with it. There is a Hot Surface label (see diagram) attached to the aforementioned surface of the product.

Introduction

Congratulations on your selection of a Wohler Technologies product. We are confident it represents the best performance and value available, and we guarantee your satisfaction with it.

If you have questions or comments you may contact us at:

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Section 1

General Features, Specifications, and Installation

Description

Features

Applications

General Specifications

Installation

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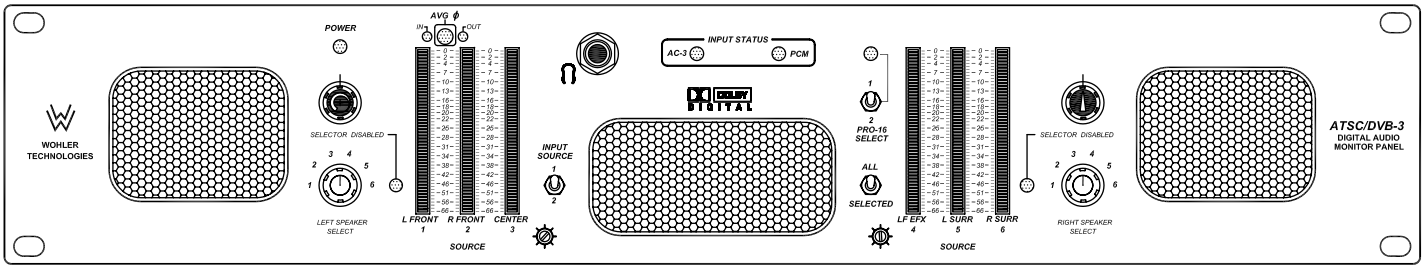
ATSC/DVB-3

Powered Digital Audio Monitor Unit



ATSC/DVB-3 Front Panel

Description

The ATSC/DVB-3 is a powered stereo monitor designed specifically for flexible, comprehensive monitoring of the six audio channels associcated with ATSC/DVB programming. The unit is 2RU in size, for excellent fidelity without using excessive rackspace in the critical "operating zone" of rack bays and consoles.

The ATSC/DVB-3 accepts AES/EBU and/or Dolby Digital® (AC-3) input signals providing capabilities to handle monitoring requirements throughout the facility.

The speakers and amplifiers are arranged in the popular Wohler “biamp summed bass stereo” configuration: bass frequencies from ALL selected channels are summed into a 20W amplifier, which drives the woofer. The two side channel amplifiers and speakers reproduce, in stereo, only the mid- and high- frequencies. Note that the center speaker (the woofer) is NOT a dedicated Center nor LFE speaker. There is also a headphone output, which mutes the speakers while in use.

High-resolution, wide-range LED bargraph level meters are provided for all six channels for very accurate metering. 53 bicolor segments spanning a range of 65 or 90 dB simultaneously display signal levels according to both the PPM and VU standards. An adjustable-duration hold of the peak PPM value may also be displayed.

Both Left/Right and Front/Surround "Phase"/Polarity LED indications are provided to alert of possible cancellation from mixdown in any likely home playback situation.

To isolate possible faults, rotary switches let the operator route any one or pair of inputs to left and right speaker channels for acoustic monitoring. A toggle switch mixes all six channels down to two for listening to all channels at once.

Features

- 2U high: highest fidelity in minimum rackspace
- AES/EBU, or encoded ATSC/MPEG-2 (Dolby Digital®) inputs on BNC and XLR connectors
- Simultaneous visual monitoring of all 6 channels
- 53-segment tri-color, wide-range, high-resolution LED bargraph level meters
- SDI and AES Status Indication LEDs
- Pro-16 signal select switch and indication LED
- Left/Right Front “phase" indicators
- Select any channel or pair of channels for isolated listening, or a stereo mixdown of all 6 channels
- Selected channel analog outputs on XLR connectors
- Headphone output

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Applications

The **ATSC/DVB-3** is ideally suited for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia systems, satellite links and cable TV facilities, and on-air radio studios. Designed and manufactured in the U.S., the **ATSC/DVB-3** is backed by a strong warranty and a satisfaction guaranteed return policy.

General Specifications

Input Meter Dynamics:	Simultaneous VU (bar) and PPM (dot)
Input Level for Maximum Output (Volume Full On):	0 dBv balanced
Input Overload:	+26 dBv balanced
Peak Acoustic Output (@ 2 ft.):	104 dB SPL
Response, Sixth Octave:	80 Hz - 16 kHz ± 5 dB) (-10 dB @ 40 Hz, 20 kHZ)
Power output, **RMS Each Side (4Ω):** **RMS Bass (4Ω):**	 14 W transient / 10 W continuous 35 W transient / 25 W continuous
Distortion, Electrical:	Less than 0.15% at any level below limit threshold
Distortion, Acoustic:	6% or less at worst case frequencies above 120 Hz, including cabinet resonance; typically less than 1.5%
Hum and Noise:	Better than -68 dB below full output
Magnetic shielding:	Less than 0.8 Gauss any adjacent surface
Input connectors:	Balanced: XLR
Power consumption (Average Maximum):	60 W
AC Mains input:	100-220VAC, 50-60 Hz
"ALL" Channel Summing Assignments*:	Left Side = LFront+LSurr+1/2Center+1/2LFE Right Side = RFront+RSurr+1/2Center+1/2LFE

ATSC/MPEG-3 Input Specifications

Input impedance:	75Ω (ohm) unbalanced
Minimum input level:	250 mv
Playback mode:	"Line"
Input connector:	BNC

AES/EBU Input Specifications

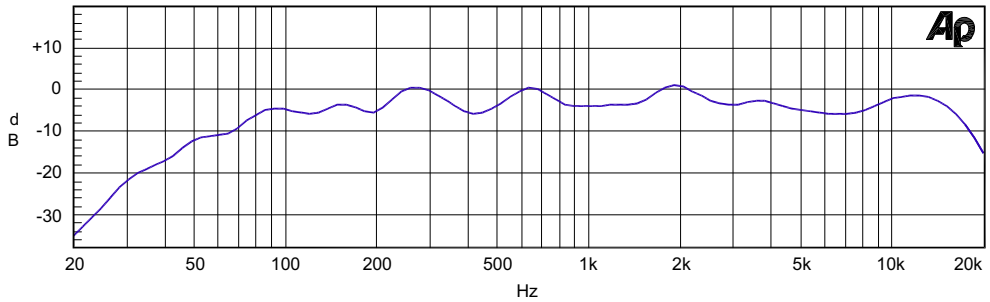
Input characteristics:	BNC:75 Ω (ohm) unbalanced XLR:110 Ω (ohm) balanced
Minimum input level:	5V p-p unbalanced, 2.2V p-p balanced
Conversion data width:	20 bit
Dynamic range:	95 dB
Frequency Response:	10 Hz - 20 kHz +/- 0.5 dB
Analog Output Distortion:	< 0.005%
Analog outputs:	balanced, line-level (-20 dbfs=+4 dBu); minimum load impedance:10k Ω (ohm)
Meter input '0' level:	-20 dBfs

Physical Specifications

Weight:	18 lbs. (8.2 kg)
Dimensions (HxWxD):	3.5 x 19 x 12 inches (89 x 483 x 298 mm)

* On special order, custom combinations of selected channels are available; either in lieu of, or in addition to, the regular selections.

Audio Response Curve



Typical 1/6 Octave Audio Response Curve

Units are designed to meet, at time of manufacture, all currently applicable product safety and EMC requirements, such as those of CE. 0 dbV ref. 0.775V RMS. Features and specifications subject to improvement without notice.

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Installation

Mounting

The unit should be mounted where convenient for operating persons, ideally at approximately ear level for best high frequency response. Its superior magnetic shielding eliminates concerns about locating it adjacent to most types of CRT monitors, including even high-resolution color monitors.

Heat Dissipation

Heat dissipated by the speaker amps is conducted directly to the left side of the chassis; no special considerations for cooling are necessary as long as the ambient temperature inside the rack area does not exceed approximately 40°C (104°F).

Sympathetic Vibration

Sympathetic vibration from other equipment (cables, etc.,) in the rack may be serious enough to interfere with the unit's sound quality out in the listening area. The use of thin card stock and/or felt or foam weather-stripping type materials between adjacent vibrating surfaces, or tying up loose cables, etc., may be required to stop vibrations external to the unit.

Mechanical Bracing

The chassis is securely attached to the front panel at eight points along its surface, not just at the four corners of the chassis ears. This feature will reduce or eliminate rear bracing requirements in many mobile/portable applications. The weight of internal components is distributed fairly evenly around the unit.

Audio Connections

Connection of the audio feeds is straightforward. Please refer to the system block diagram on page **18** for clarification of the general signal paths into and out of the **ATSC/DVB-3** unit.

Inputs are via either BNC or XLR connectors. BNC inputs are **75Ω** unbalanced; XLRs are **110Ω** balanced. Care should be exercised to avoid mis-matched cable types and other similar causes of undesired reflections in RF signal systems. If severe enough, such reflections can result in corruption of the digital datastream.

AC Power

The unit's AC mains connection is via a standard IEC inlet, with safety ground connected directly to the unit's chassis. The universal AC input (100-240VAC, 50/60Hz) switching power supply is a self-resetting sealed type, with automatic over-voltage and over-current shutdown. There is no user-replaceable fuse in either the primary or secondary circuit.

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Section 2

Operation

Front Panel Features

Rear Panel Features

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Front Panel Features

Please refer to **Figure-2a** on the facing page to familiarize yourself with the front panel features of the **ATSC/DVB-3** unit. The following sections describe these features and are referenced, by number, to **Figure-2a**.

1 Speakers (Left, Right, and Woofer)

The **ATSC/DVB-3** internal speaker system is comprised of two mid-range tweeter speakers (left and right) and one woofer speaker (middle). The two side channel speakers reproduce, in stereo, only the mid and high frequencies. Please note that the woofer speaker (middle) is not a dedicated Center nor LFE speaker. See page **14** for more information about the audio amplifier and speaker configuration.

2 Volume Control

This controls the loudness of the audio reproduced by the internal speakers or connected headphone. Clock-wise rotation of this control increases the loudness of the monitored audio in the speakers or headphones.

3 Speaker Select Switches (Left and Right)

These two six position rotary switches are used to isolate and monitor any one of the six possible channels through the left and/or right speakers. Choose positions **1** through **6** for each switch (left or right) and the chosen channel will be monitored from the respective speaker. **Note:** If the **All/Selected Switch** (**Item 8**) is set to the **ALL** position, then both of these switches are disabled and the **Selector Disabled LEDs** (**Item 4**) will glow RED.

4 Selector Disabled LED (Left and Right)

These two LEDs will glow RED to indicate that the **Speaker Select Switches** (**Item 3**) are disabled because the **All/Selected Switch** (**Item 14**) is set to the **ALL** position.

5 Audio Level Meters (1-6)

Audio levels for source channels **1**-**6** are displayed via six high resolution 53-segment LED bargraph meters (three on the left side of the front panel; three on the right side). Dynamic range for these meters is **65 dB** and they are able to display signal levels using both **PPM** and **VU** standards. An adjustable-duration hold of peak **PPM** value may also be displayed. Each meter is labeled according to the standard Surround Sound nomenclature (left front, right front, center, low frequency effects, left surround, and right surround). See page **17** for more information about these level meters.

6 Level Meter Brightness Controls (1-3 and 4-6)

The brightness of the bargraph meters are adjustable via these two recessed controls. The left control adjusts the brighness of the left three LED bargraphs (**1-3**) and the right control adjusts the brighness of the right three bargraphs (**4-6**). You must use a small flathead screwdriver or similar tool to adjust these controls.

7 Input Source Select Switch

This two position toggle switch allows the operator to choose between two possible input sources; **Input Source 1** or **Input Source 2**. **Input Source 1** accepts **AC-3** or **AES** signals and is comprised of a *balanced* input and loop-through output on XLR connectors (**Item C**) and an *unbalanced* input and loop-through output on BNC connectors (**Item D**). **Input Source 2** accepts **AC-3** or **AES** signals and is comprised of a *balanced* input on an XLR connector (**Item F**) and an *unbalanced* input on a BNC connector (**Item G**).

8 All/Selected Select Switch

When this two position toggle switch in in the **SELECTED** position, channel selection defaults to the selection as set by the right and left **Speaker Select Switches** (**Item 3**). When in the **ALL** position, a stereo mixdown of the five full channels is applied to the speaker amps (the LFE channel is excluded). Speaker channel assignment for the **ALL** setting is as follows:

- Left Speaker Channel = LFront + LSurr + 1/2Center
- Right Speaker Channel = RFront + RSurr + 1/2Center

9 Balance Control

This adjusts the volume balance between the left and right speakers or headphones.

10 Power LED

The LED glows GREEN to indicate the unit is connected to mains power and an operation voltage is present.

(Continued)

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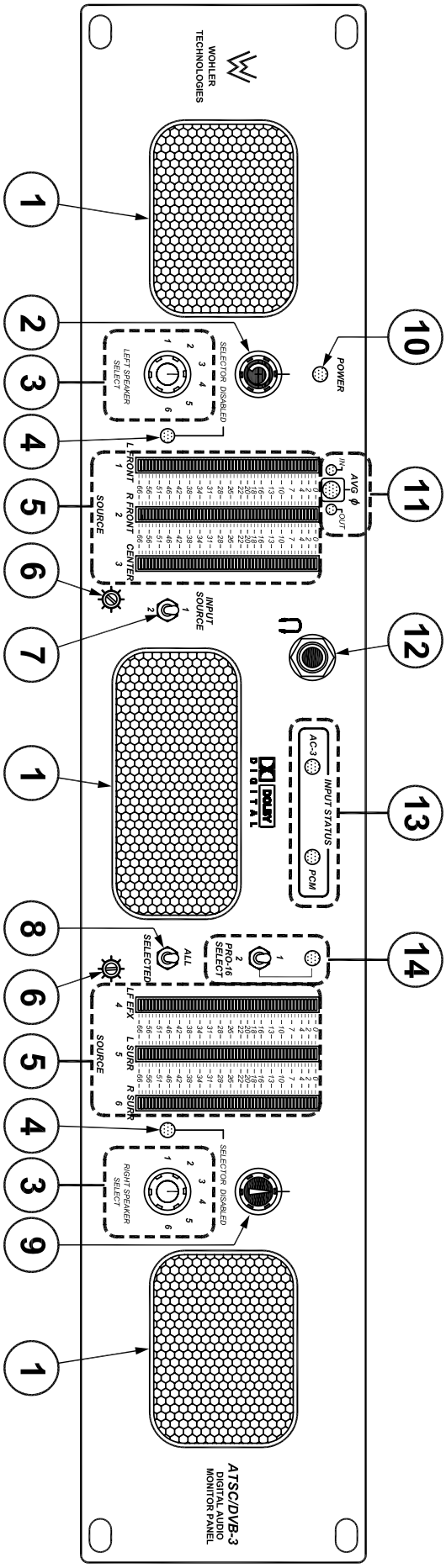

Figure-2a: Front Panel Features

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Front Panel Features

(Continued)

11 Phase Indication LEDs (IN, AVG, OUT)

These three LEDs indicate the instantaneous and average phase (polarity) conditions between the source(s) assigned to the *left* speaker channel and the source(s) assigned to the *right* speaker channel. The larger LED labeled **AVG** indicates the *average* phase condition between the left and right speaker channels. The two smaller LEDs labeled **IN** and **OUT** indicate the *instantaneous* phase relationships. Indication is as follows:

- The *left* **IN** LED glows (or blinks) GREEN for ***in-phase*** signals.
- The *right* **OUT** LED glows (or blinks) AMBER for ***out-of-phase*** signals.
- The large *center* **AVG** LED indicates the *average* phase condition by glowing GREEN for ***in-phase*** signals, or RED for ***out-of-phase*** signals.

In general, observing the **AVG** LED alone is sufficient for proper phase monitoring. While it is normal for stereo signals to contain some intermittant instantaneous *out-of-phase* and *in-phase* conditions (**IN** and **OUT** LEDs), a steady RED glow of the **AVG** LED indicates an *out-of-phase* alarm condition.

12 Headphone Jack

This jack accepts a standard 1/4" phone type stereo plug. When you plug in headphones, the internal speakers will mute.

13 Input Status LEDs (AC-3 and PCM)

One of these two LEDs will glow GREEN to indicate which kind of signal is being received at the selected input; either the left LED for **AC-3** (Dolby Digital®) or right LED for **PCM** (Pulse Code Modulation or standard **AES**).

14 Pro-16 Select Switch and Indication LED

In the event that you are processing two different Dolby Digital Pro-16 data streams it is possible to select between the two with this toggle switch. The LED will glow AMBER if such signals are present. In the absence of such data streams, the LED will not be lit and the switch will be nonfunctional.

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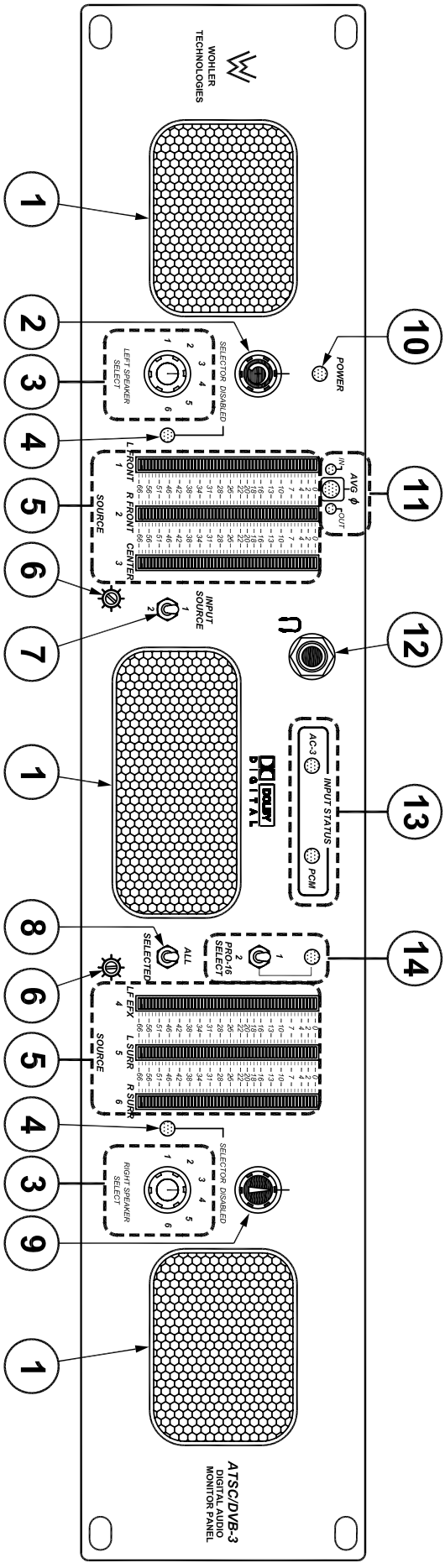

Figure-2a: Front Panel Features

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Rear Panel Features

Please refer to **Figure-2b** on the facing page to familiarize yourself with the rear panel features of the **ATSC/DVB-3** units. The following sections describe these features and are referenced, by letter, to **Figure-2b**.

A Power Connector

Attach a standard IEC-320 power cord between this connector and mains power (100 - 240VAC nominal, 50/60 Hz). The front panel **Power LED** (**Item 10**, page **8**) will glow GREEN to indicate operating voltages are present.

B Option DIP Switch

This DIP switch is reserved for possible future options. You may disregard its settings.

C Source 1 Balanced Input and Output Connectors (IN and LOOP)

This 3-pin female XLR **IN** connector is meant to receive either **AC-3** (**Dolby Digital®**) *or* standard **AES** (**PCM**) signals and is configured for a balanced, **110 Ω** connection. The 3-pin *male* XLR **LOOP** connector outputs a copy of the signal entering the balanced input.

Note: Do NOT simultaneously connect a signal source to the balanced and unbalanced inputs in the same source channel (i.e. **Source 1** BNC and XLR input connectors).

D Source 1 Unbalanced Input and Output Connectors (IN and LOOP)

This female BNC **IN** connector is meant to receive either **AC-3** (**Dolby Digital®**) *or* standard **AES** (**PCM**) signals and is configured for an unbalanced, **75 Ω** connection. The BNC **LOOP** connector outputs a loop-through copy of the signal entering the unbalanced input.

Note: Do NOT simultaneously connect a signal source to the balanced and unbalanced inputs in the same source channel (i.e. **Source 1** BNC and XLR input connectors).

E Termination Settings DIP Switch (Source 1 and 2)

This DIP switch sets the termination characteristics of the **Source 1** and **Source 2** balanced and unbalanced input connectors. There are two switches; one for the **Source 1** balanced *and* unbalanced inputs (**S1**), and a second switch for the **Source 2** balanced *and* unbalanced inputs (**S2**). In the event that signals entering **Source 1** or **2** are connected to downstream equipment, then the respective DIP switch should be set to the **UP** (**Unterminated**) position. If there is ***no*** connection to downstream equipment, then the respective DIP switch should be set to the **DOWN** (**Terminated**) position.

F Source 2 Balanced Input Connector

This 3-pin female XLR **IN** connector is meant to receive either **AC-3** (**Dolby Digital®**) *or* standard **AES** (**PCM**) signals and is configured for a balanced, **110 Ω** connection.

Note: Do NOT simultaneously connect a signal source to the balanced and unbalanced inputs in the same source channel (i.e. **Source 2** BNC and XLR input connectors).

G Source 2 Unbalanced Input Connector

This female BNC **IN** connector is meant to receive either **AC-3** (**Dolby Digital®**) *or* standard **AES** (**PCM**) signals and is configured for an unbalanced, **75 Ω** connection.

Note: Do NOT simultaneously connect a signal source to the balanced and unbalanced inputs in the same source channel (i.e. **Source 2** BNC and XLR input connectors).

H Selected Analog Output Connectors

These two 3-pin male XLR connectors output **analog** stereo signals of the selected source. When the **All/Selected Select Switch** (**Item 8**, page **8**) is set to **SELECTED**, these connectors output the source as selected by the left and right **Speaker Select Switches** (**Item 3**, page **8**). If the **All/Selected Select Switch** is set to **ALL**, then these connectors output a stereo mix of all five main channels (the LFE channel is excluded). The signals output from these connectors are unaffected by the **volume** and **balance controls** (**Items 2** and **9**, page **8**) and **headphone** mute feature (**Item 12**, page **10**).

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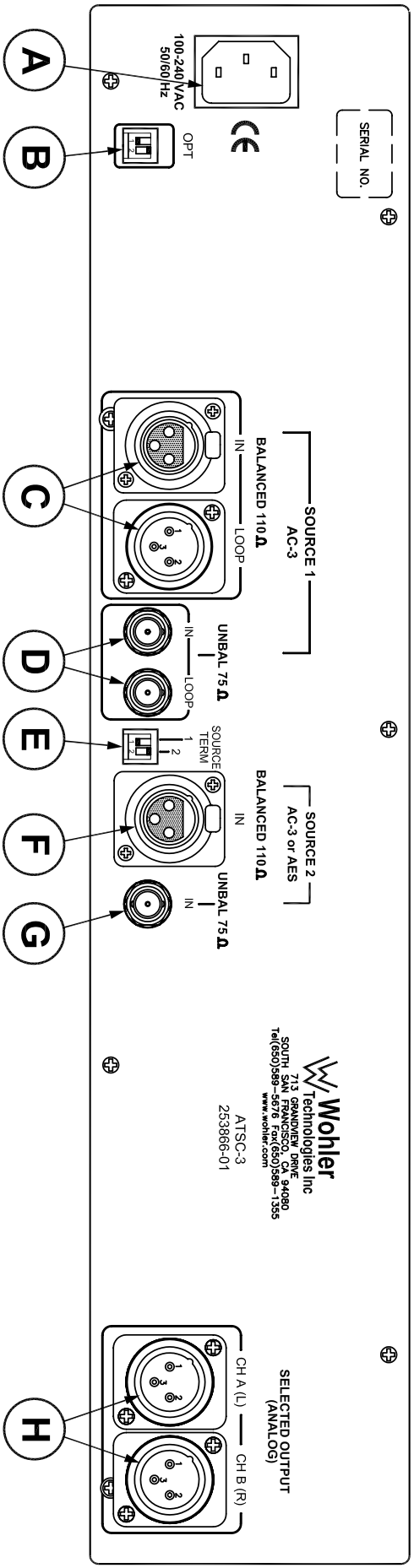

Figure-2b: Rear Panel Features

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Audio Amplifier and Speaker Configuration

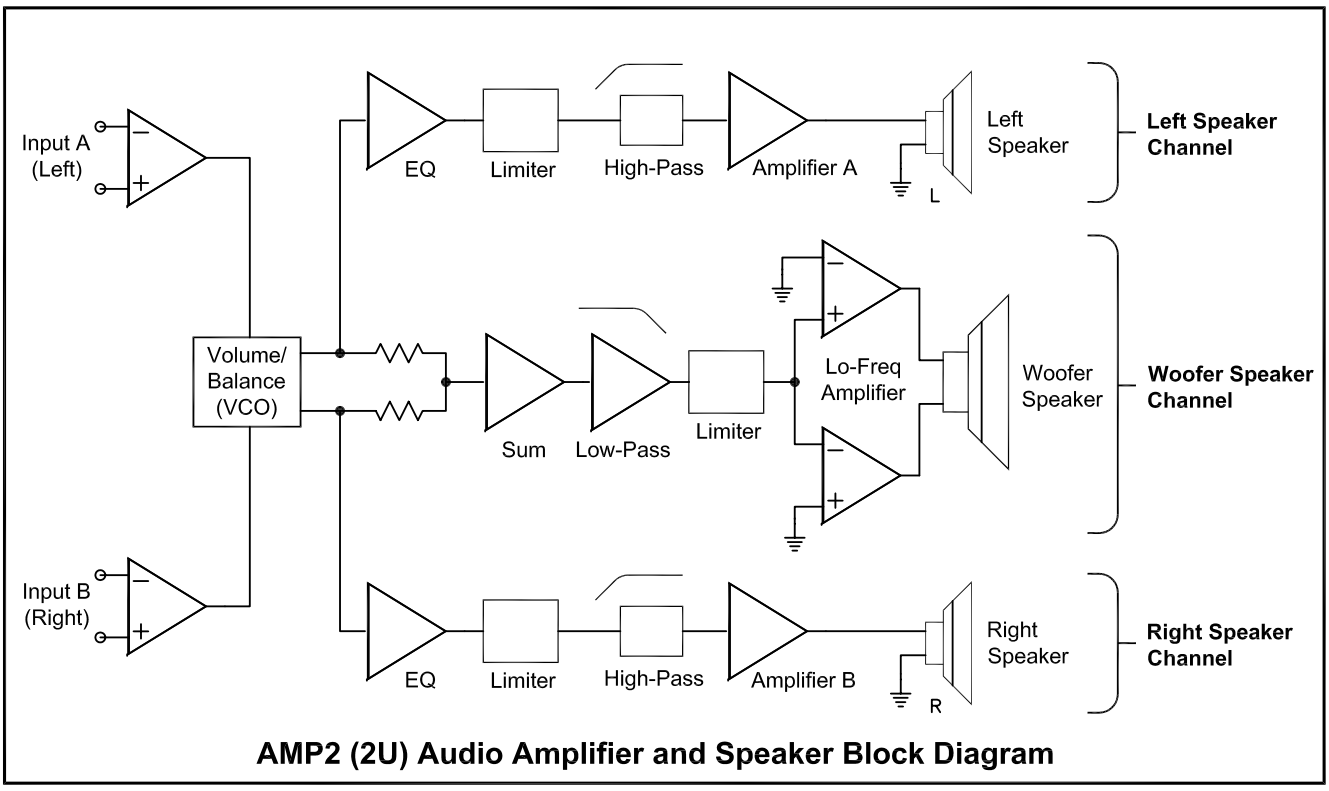
General Description

The **NTSC/DVB-3** monitor uses the Wohler **AMP2 Series** speaker configuration, which features high performance transducers (speakers) driven by three power amplifiers; two amplifier/driver combinations handle midrange and high frequency information in the left and right (stereo) speaker channels, while the third amplifier channel sums the left and right channel information *below* the 500 Hz crossover point in the woofer (bass) speaker(s). Note that the woofer channel is NOT a dedicated **LFE** (subwoofer) or **Center** channel.

Speaker Configuration

AMP2 Series speaker system is configured with two speaker channels (left and right) to reproduce midrange and high-range audio frequencies (in stereo) and one woofer speaker channel to reproduce the summed (combined) *low-range* audio frequencies from the left and right speaker input channels.

See below for a simplified diagram of the audio amplifier/speaker configuration.



AMP2 (2U) Audio Amplifier and Speaker Block Diagram

Balance Control Characteristics

The balance control attenuates the signal from the source, so that the left and right bass frequencies (summed together and reproduced in the woofer channel) will also respond to the balance control.

Example:

If an audio signal of a voice speaking English is fed to the *left* (A) input and a voice speaking Spanish is fed to the *right* (B) input, then the *left* speaker channel will reproduce the midrange and high-range frequencies of the English speaking voice, the *right* speaker channel will reproduce the midrange and high-range frequencies of the Spanish speaking voice, and the *woofer* speaker channel will reproduce the summed (combined) low-range frequencies of *both* voices.

If the balance control is rotated to the *left* (English), then the Spanish speaking voice in the *right* speaker channel will diminish in volume and the Spanish speaking voice in the *woofer* speaker channel will also diminish.

Note that if the balance control is rotated completely to the left, the volume in both the left (or right) speaker channel and woofer speaker channel will increase slightly to maintain overall output level.

The converse of the above is true if the balance control is rotated to the *right*.

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Section 3

Technical Information

General Technical Observations
Level Meter Description and Specifications
ATSC/DVB-3 Block Diagram

NOTE:
PCB layout and schematic support documentation is available upon request.

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General Technical Observations

General Mechanical Observations

Elimination of cabinet and component sympathetic vibrations (resonances) requires considerable attention to mechanical details. Because of this, and the physical constraints of the speakers acoustic enclosures, even minor changes to any of the mechanical details of the unit can seriously impair its acoustic performance. This especially applies to the speaker baffles. If mechanical work on the unit is necessary, be sure to make adequate notes to permit accurate reassembly.

Unfortunately, the unusual and wholly proprietary method of magnetic shielding is usually degraded slightly by any disassembly of the unit, except removal of the rear panel. Almost any maintenance or repair will require removal of the cover. If an immediately adjacent video monitor shows magnetic interference after reassembly of the unit, it must be returned to the factory to restore the shielding completely.

General Audio Circuitry Observations

Since a single-sided power supply is used, all amplifier sections are "biased" with a 1/2 supply reference, so all opamp signal terminals on the main board should have a DC level of +12V, +/-0.7V. Signal inputs to the main audio board from any of the input select circuits are via the balanced input stage, in lieu of the XLR analog inputs on the basic unit. Signal feed points for level meters and the phase indicator are immediately after the input stage, and before the volume control section.

The signal pick-off for the headphones is after the volume and balance controls. Speaker muting is controlled by circuitry that senses connection of headphones to the jack.

The power amps are attached to an aluminum heatsink plate (which is also connected to the circuit common for these devices). The heatsink plate forms an operational module separate from the chassis, which allows access to the solder side of the circuit board while power is applied to the circuitry. To avoid thermal shutdown of the power amp(s), they should NOT be operated without their tabs being fastened to the heatsink plate.

Variations in the frequency response of different production runs of drivers has sometimes required minor adjustments in the equalization/crossover components in individual runs of units. Some of these components may have values slightly different than those indicated in the schematic, which are the nominal ones. If any of the drivers (speakers) are replaced, it may be helpful to change some of these components to achieve maximum flatness of response.

The operating threshold of the woofer limiter is critical to both satisfactory reproduction of musical transients and preventing damage to, or destruction of, the speaker itself. The side speaker output limiter circuits are similarly important, though not as critically adjusted.

The woofer power amps are arranged in a bridge configuration; care must be taken to avoid letting EITHER speaker terminal contact the chassis (common) OR THE GROUNDED LEAD OF ANY TEST EQUIPMENT so as not to short out the power amps. The side speaker outputs are single-ended, so these precautions are not necessary for them.

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Level Meter Description and Specifications

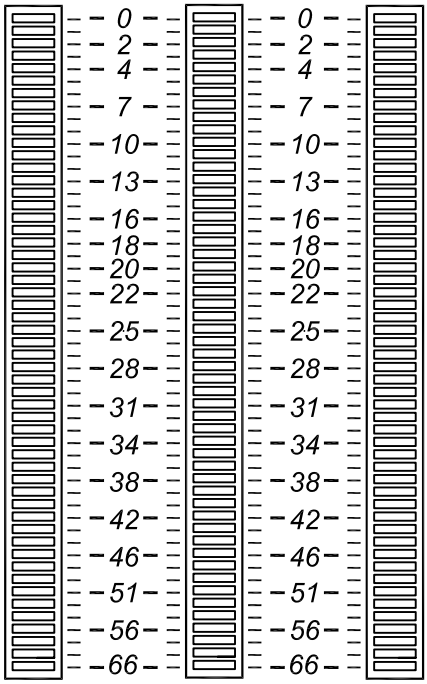
Description

The 53-segment type of tri-color LED bargraph display has a total length of 2.24" (56.8 mm) and uses relatively small segments. This high resolution segment size is easy to accurately monitor, visually, for distances up to six feet (1.8 meters). Segment size is 0.158" (4 mm) x 0.04" (1 mm). Segment pitch is 0.039" (0.99 mm).

Each LED bargraph display section visually indicates the dynamic changes within the audio signal source(s) being monitored. All bargraph LED segments are of the tri-color type (green, amber, red). Ballistics for these meters are factory set to display a single floating PPM 'dot' (continuous decay of 20 dB in 1.5 seconds) above a VU bar; each segment's color being fixed according to its position on the scale. Level gain is factory set at +4 dBu. Dynamic range for these 53-segment meters is 65 dB.

Scales

Please refer to the figure below for an illustration showing the standard scale for the 53-segment bargraph display used in the **ATSC/DVB-3** audio monitor. Custom variations of this scale are also available on special order.



Dynamic range, dB:	65 dB
Midscale resolution:	1 dB
Segment Quantity:	53
Segment size:	0.158" (4 mm) x 0.04" (1 mm)
Segment pitch:	0.039" (.99 mm)

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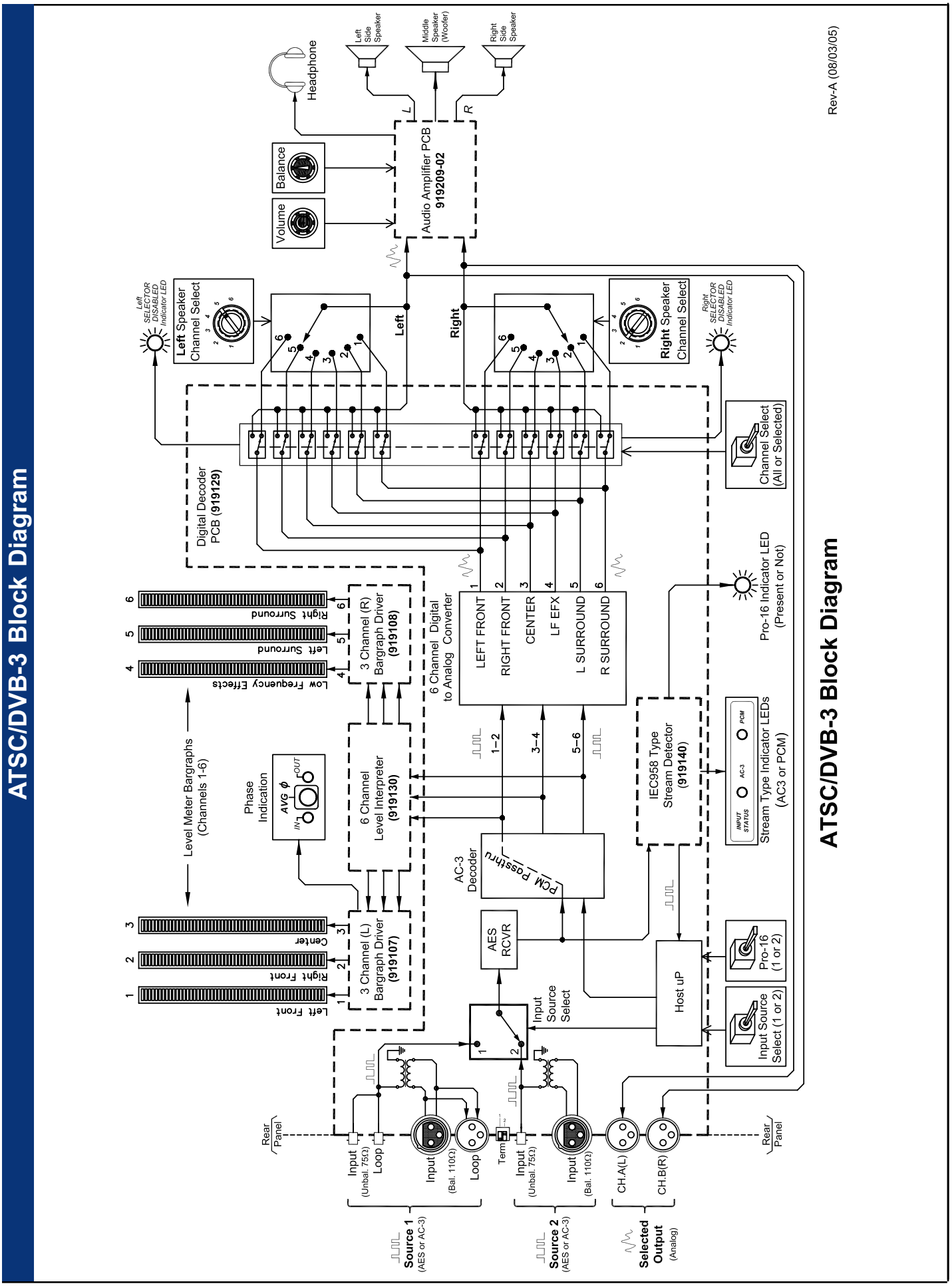

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NOTES:

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